

WHAT IS CLAIMED IS:

1. A system for diagnosing degradation of a plurality of wires in an electrical system having plurality of loads connected by the plurality of wires to a direct current power source, the plurality of wires arranged into a bundle near the power source, the system comprising:
 - (a) a current sensor located proximate to the bundle for producing a signal representative of a current in the bundle;
 - (b) a signal processor coupled to the sensor to receive the signal from the current sensor;
 - (c) a pattern database coupled to the signal processor to provide the signal processor with expected patterns of currents drawn by the plurality of loads and patterns of arcs which may occur in the plurality of wires; and,
 - (d) an output device coupled to the signal processor to receive an indication of a location at which an arc occurred in the plurality of wires.
2. The system of claim 1 wherein the current sensor comprises an optical current sensor.
3. The system of claim 1 or 2 wherein the electrical system comprises a mobile vehicle's electrical system.
4. The system of claim 3 wherein the output device comprises a CPU of the mobile vehicle.
5. The system of claim 3 wherein the output device comprises a display on a dashboard of the mobile vehicle.
- 30 6. A method for diagnosing degradation of a plurality of wires in an electrical system having plurality of loads connected by the plurality of wires to a direct current power source, the plurality of wires arranged into a bundle near the power source, the method comprising:
 - (a) placing a current sensor proximate to the bundle for producing a signal representative of a current in the bundle;
 - (b) monitoring a time-rate-of-change of the signal from the current sensor;

- 7 -

- (c) comparing the time-rate-of-change of the signal from the current sensor to expected patterns of currents drawn by the plurality of loads and patterns of arcs which may occur in the plurality of wires; and,
- 5 (d) applying time domain reflectometry to produce an indication of a location at which an arc occurred in the plurality of wires.

7. The method of claim 6 wherein the electrical system comprises a mobile vehicle's electrical system, the method further comprising providing the indication of the location at which the arc occurred to a CPU of the mobile vehicle.

10

8. The method of claim 6 wherein the electrical system comprises a mobile vehicle's electrical system, the method further comprising displaying the indication of the location at which the arc occurred on a dashboard of the mobile vehicle.

15

9. A tool for diagnosing degradation of a plurality of wires in an electrical system having plurality of loads connected by the plurality of wires to a direct current power source, the plurality of wires arranged into a bundle near the power source, the tool comprising:

20

- (a) a current sensor located proximate to the bundle for producing a signal representative of a current in the bundle;
- (b) a signal processor coupled to the sensor to receive the signal from the current sensor;
- 25 (c) a pattern database coupled to the signal processor to provide the signal processor with expected patterns of currents drawn by the plurality of loads and patterns of arcs which may occur in the plurality of wires; and,
- (d) an output device coupled to the signal processor to receive an indication of a location at which an arc occurred in the plurality of wires.

30